

**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1-22. (Canceled)

23. (Currently amended) A system for forming a reflective grating from a tape having a substrate, an adhesion layer, and a reflective surface layer affixed to the substrate by the adhesion layer, the system comprising:

a feed roll having the tape rolled thereon;

a drive roller for retrieving the tape from the feed roll;

a laser for sequentially writing discrete grating lines with a laser spot generated by said laser onto the tape, said laser spot ~~[[by]]~~ vaporizing portions of the reflective surface layer to expose the adhesion layer;

a scan head for synchronizing a path of said laser spot with a motion of the tape so that the discrete grating lines are substantially orthogonal to the axis of motion of the tape;  
and

a take-up reel for rolling the tape into a roll after being vaporized by the laser.

24. (Currently amended) A system for forming a reflective grating as recited in claim 23 further comprising a read head for verifying that the laser ~~station~~ vaporizes has vaporized the portions of reflective surface layer, wherein said read head includes a laser source that emits a laser beam toward said discrete grating lines to generate a diffraction pattern and oscillates along the axis of motion of the tape and estimates spatial frequencies of the discrete grating lines by detecting and analyzing said diffraction pattern.

25. (Currently amended) A system for forming a reflective grating as recited in claim 23 further comprising a contact adhesive feed roll for applying a strip of contact adhesive to the substrate.

26. (Currently amended) A system for forming a reflective grating as recited in claim 23 wherein the laser is a high-frequency pulsed laser ~~that vaporizes the surface layer.~~

27. (Canceled).

28. (Canceled).

29. (Currently amended) A system for forming a reflective grating as recited in claim 23 wherein the reflective surface layer is a photo-~~imagable~~ imageable layer ~~and the grating lines are formed in the surface layer by selectively exposing portions of the photo-imagable layer with the laser.~~

30. (New) A system for forming a reflective grating tape, comprising:  
a feed roll having a tape rolled thereon, said tape including:  
    a substrate layer;  
    an adhesion layer disposed on the substrate layer; and  
    a reflective surface layer disposed on the adhesion layer and affixed to the substrate layer by the adhesion layer;  
a direct drive roller for retrieving said tape from said feed roll and conveying said tape at a predetermined speed;  
a forward tension roller located downstream of said direct drive roller in a conveying direction of said tape and operative to apply a tension to a portion of said tape between said direct drive roller and said forward tension roller;  
a take-up reel for receiving said tape conveyed from said forward tension roller and winding said tape thereon;  
a platen positioned between said direct drive roller and said forward tension roller and including a surface that provides a precision ground for said tape when a side of said substrate opposite to said reflective surface layer is in contact with said surface;  
a laser; and

a scan head for scanning a laser spot generated by said laser across the reflective surface layer to define discrete parallel lines on said reflective surface layer, said parallel lines being aligned substantially perpendicular to the conveying direction of said tape, said laser spot vaporizing said reflective surface layer along said parallel lines to generate grating lines as said tape is drawn across the surface of the platen.

31. (New) A system for forming a reflective grating tape as recited in claim 30, further comprising:

a movable read head including a laser source that emits a laser beam toward said grating lines to generate a diffraction pattern, said read head being caused to oscillate along the conveying direction of said tape and operative to detect and analyze said diffraction pattern in order to estimate spatial frequencies of said grating lines and to verify that said laser has vaporized said reflective surface layer along said parallel lines.

32. (New) A system for forming a reflective grating tape as recited in claim 31, wherein said platen is flat and thermo-electrically cooled to maintain a stable temperature thereof and thereby to provide a stable environment for generating said diffraction pattern.

33. (New) A system for forming a reflective grating tape as recited in claim 31, wherein said read head is selected from the group consisting of a single stationary read head and two stationary read heads.

34. (New) A system for forming a reflective grating tape as recited in claim 31, further including a process control system that provides real-time statistical process control data including deviations in grating speed, quadrature amplitude and quadrature phase-shift of said diffraction pattern, said statistical data being used to optimize the performance of said system over time.

35. (New) A system for forming a reflective grating tape as recited in claim 31, wherein said scan head includes a precision flexure assembly and an actuator with angle feedback to enhance fidelity level in scanning said diffraction pattern.

36. (New) A system for forming a reflective grating tape as recited in claim 30, further comprising:

a contact adhesive feed roll having an adhesive tape rolled thereon; and  
an adhesive applying roller for retrieving said adhesive tape from said contact adhesive feed roll and for continuously applying said adhesive tape to the side of said substrate layer opposite to said reflective surface layer.

37. (New) A system for forming a reflective grating tape as recited in claim 30, further comprising:

a process control system for monitoring rotations of said feed roll, direct drive roller, forward tension roller and take-up reel and operative to provide control signals to said feed roll, direct drive roller, forward tension roller and take-up reel so as to provide a stable movement of said tape as it is drawn over said platen.

38. (New) A system for forming a reflective grating tape as recited in claim 37, wherein said process control system monitors the temperature of said platen and provides control signals to said platen so as to maintain a stable temperature thereof, and thereby to reduce distortion of said tape.

39. (New) A system for forming a reflective grating tape as recited in claim 30, wherein said direct drive roller has a nanoscale resolution to control the conveying speed of said tape.

40. (New) A system for forming a reflective grating tape as recited in claim 30, wherein said scan head is selected from the group consisting of an one axis scan head and a two axis scan head.

41. (New) A system for forming a reflective grating tape as recited in claim 30, wherein said substrate layer is made of a material that has a low thermal expansion coefficient.

42. (New) A system for forming a reflective grating tape as recited in claim 30, wherein said substrate layer is made of a material selected from the group consisting of Invar and Super Invar, said reflective layer is made of gold, and said adhesion layer is made of nickel.

43. (New) A system for forming a reflective grating tape as recited in claim 30, wherein said laser spot vaporizes said adhesion layer along said parallel lines.

44. (New) A system for forming a reflective grating tape as recited in claim 30, wherein said reflective surface layer is made of a photo-imageable material.